APPALACHIAN RIVERS III CONFERENCE AND EXHIBIT

WELCOME

by

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Conference Co-Chair
& Founder

THANK YOU

CO-CHAIRS

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CONFERENCE COORDINATOR

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APPALACHIAN RIVERS III

TECHNOLOGY FOR ECOLOGY OF STREAMS & RIVERS

APPALACHIAN RIVERS III CONFERENCE AND EXHIBIT

FEATURES

- **FOCUS ON TECHNOLOGY FOR ECOLOGY**

  1. **MONITORING**
  2. **ANALYSIS & UNDERSTANDING**
  3. **CHARACTERIZATION, MODEL DEVELOPMENT & SIMULATION**
  4. **DIAGNOSTICS**
  5. **PROBLEM MITIGATION**

- **TO BRING TOGETHER IN THE SAME ROOM & SAME TIME**

WATERSHED STEWARDS
MANUFACTURERS
GOVERNMENT MULTI-AGENCY REPS
RESEARCHERS
TECHNOLOGY DEVELOPERS
MULTI-DISCIPLINES
MULTI-PERSPECTIVES

ABOUT APPALACHIAN RIVERS CONFERENCE

THIS CONFERENCE IS ABOUT

BRINGING TOGETHER PEOPLE OF ALL DISCIPLINES, GOV'T AGENCIES, MANUFACTURERS, UNIVERSITIES, WATERSHEDS, PRIVATE GROUPS, & OTHERS, AS TEAM MEMBERS IN SAME ROOM, AT SAME TIME, TO HEAR SAME MESSAGES, FROM ALL PERSPECTIVES

ABOUT APPALACHIAN RIVERS CONFERENCE

IN ORDER TO:

- **BRING YOU STATE OF THE ART TECHNOLOGY**

- **HELP GET THE TECHNOLOGY YOU NEED DEVELOPED**

- **DEVELOP A GREATER QUANTIFIABLE UNDERSTANDING**
- **OF STREAM AND RIVER ECOSYSTEMS**

- **HELP YOU GET THE DATA YOU NEED TO DO MORE**
- **COMPREHENSIVE ASSESSMENTS**

- **INFORM EVERYONE ON ADVANCED MITIGATION METHODS**

- **OBTAIN INPUT & DISCUSSION FROM EACH OF YOU**

By L. Zane Shuck

WHY DO WE NEED THIS CONFERENCE?

- **FOCUS ON TECHNOLOGY FOR ECOLOGY**

A SYSTEMS APPROACH

1. MONITORING & DATA REDUCTION
2. ANALYSIS & UNDERSTANDING
3. CHARACTERIZATION, MODEL DEVELOPMENT & SIMULATION
4. DIAGNOSTICS & ASSESSMENTS
5. PROBLEM MITIGATION
   a) Design
   b) Implementation

STATUS OF THE ABOVE TECHNOLOGIES FOR EACH OF THE ECOSYSTEM MAJOR COMPONENTS IN STREAMS AND RIVERS

1. WATER & CHEMICAL COMPONENTS
2. MACRO INVERTEBRATES
3. VERTEBRATES - FISH, FROGS
4. MICRO ORGANISIMS
   a. phytoplankton - algae
   b. bacteria
   c. viruses

APPALACHIAN RIVERS III CONFERENCE AND EXHIBIT

- **FOCUS ON TECHNOLOGY FOR ECOLOGY**

WHAT IS DRIVING THIS TECHNOLOGY DEVELOPMENT AND APPLICATION?

a) Market through private enterprise

b) Governments – Fed & State
   i) inundated with other missions
   ii) no specific such program

c) University research & graduate education

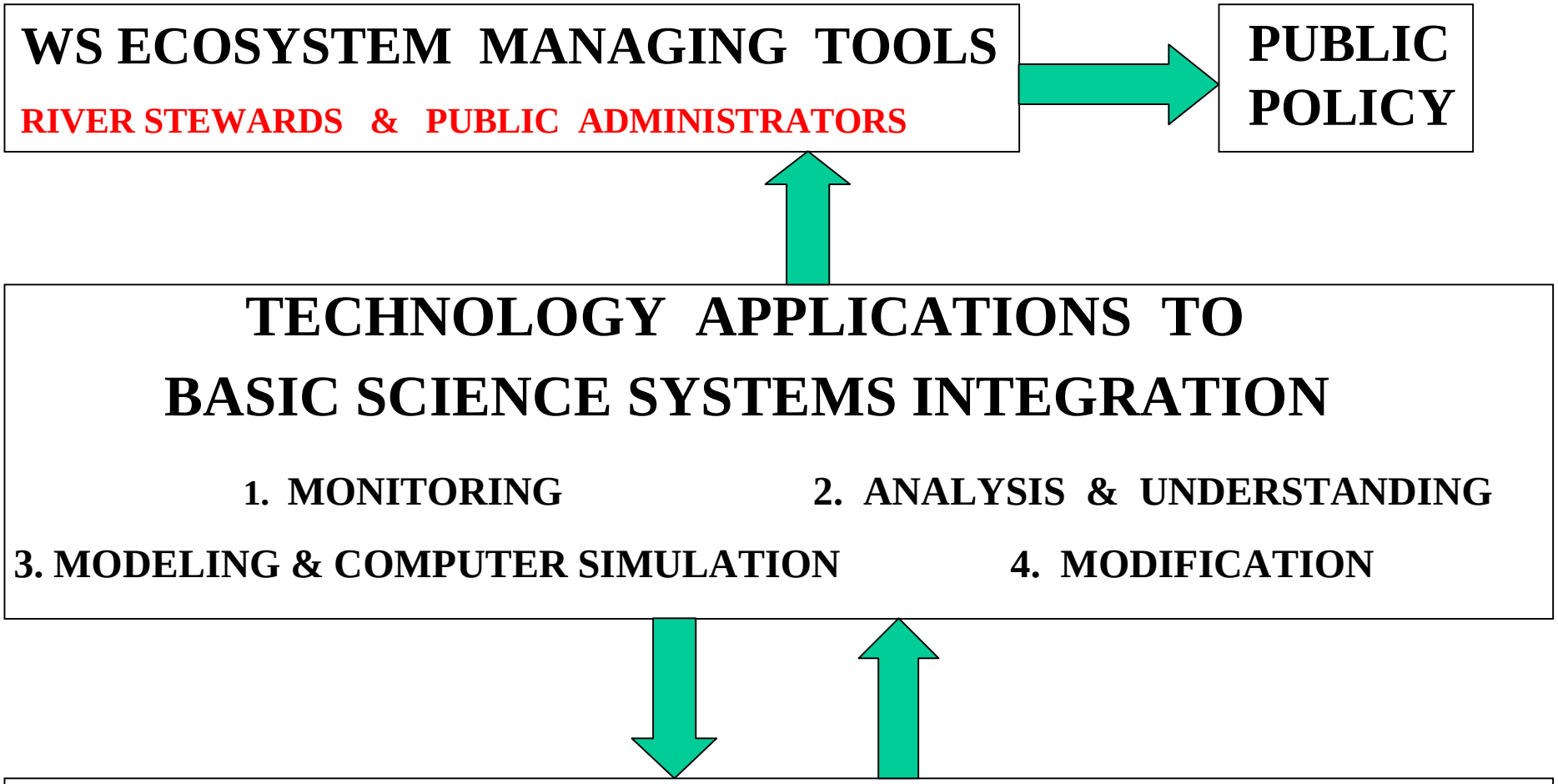
d) Technology transfer

e) Response to crises

f) Watershed organizations

HOW WE DELIVER HEALTH CARE TO HUMANS (TECHNOLOGY ISSUES)

- **COMPREHENSIVE DIAGNOSTIC TOOLS FOR EACH COMPONENT**
- **KNOW RELATIONSHIPS/DEPENDENCIES BETWEEN COMPONENTS**
- **CAN MODEL INDIVIDUAL COMPONENTS**
  - **NOT ONLY BLACK BOX, BUT, FROM INTERNAL CONSTRUCTION**
- **CAN SIMULATE INDIVIDUAL COMPONENTS**
- **CAN MODEL AND SIMULATE THE COMPONENTS AS SYSTEMS**
- **DEVELOPMENT OF TOOLS IS MARKET DRIVEN INCENTIVES TO MFGR'S, RESEARCHERS, PROVIDERS, HOSPITALS, DOCTORS ---THE ENTIRE CHAIN**
- **EXTENSIVE GOVERNMENT R & D PROGRAMS FOR MEDICAL TECHNOLOGY DEVELOPMENT**


WS ECOSYSTEM MANAGING TOOLS
RIVER STEWARDS & PUBLIC ADMINISTRATORS
PUBLIC POLICY
TECHNOLOGY APPLICATIONS TO
BASIC SCIENCE SYSTEMS INTEGRATION
1. MONITORING
2. ANALYSIS & UNDERSTANDING
3. MODELING & COMPUTER SIMULATION
4. MODIFICATION
INTERDEPENDENT BASIC SCIENCE SYSTEMS
WATER
QUALITY
FLOODS
EROSION
MICROBES
PLANT
& ANIMAL
MACRO
AQUATIC
PLANTS &
HABITATS
AQUATIC
ANIMALS
BIOTA
FISH
BENTHIC

STREAM ECOSYSTEM

MAJOR COMPONENTS

WATER

BIOTA MACRO

BIOTA MICROBES

BENTHIC

BENTHOS MACRO

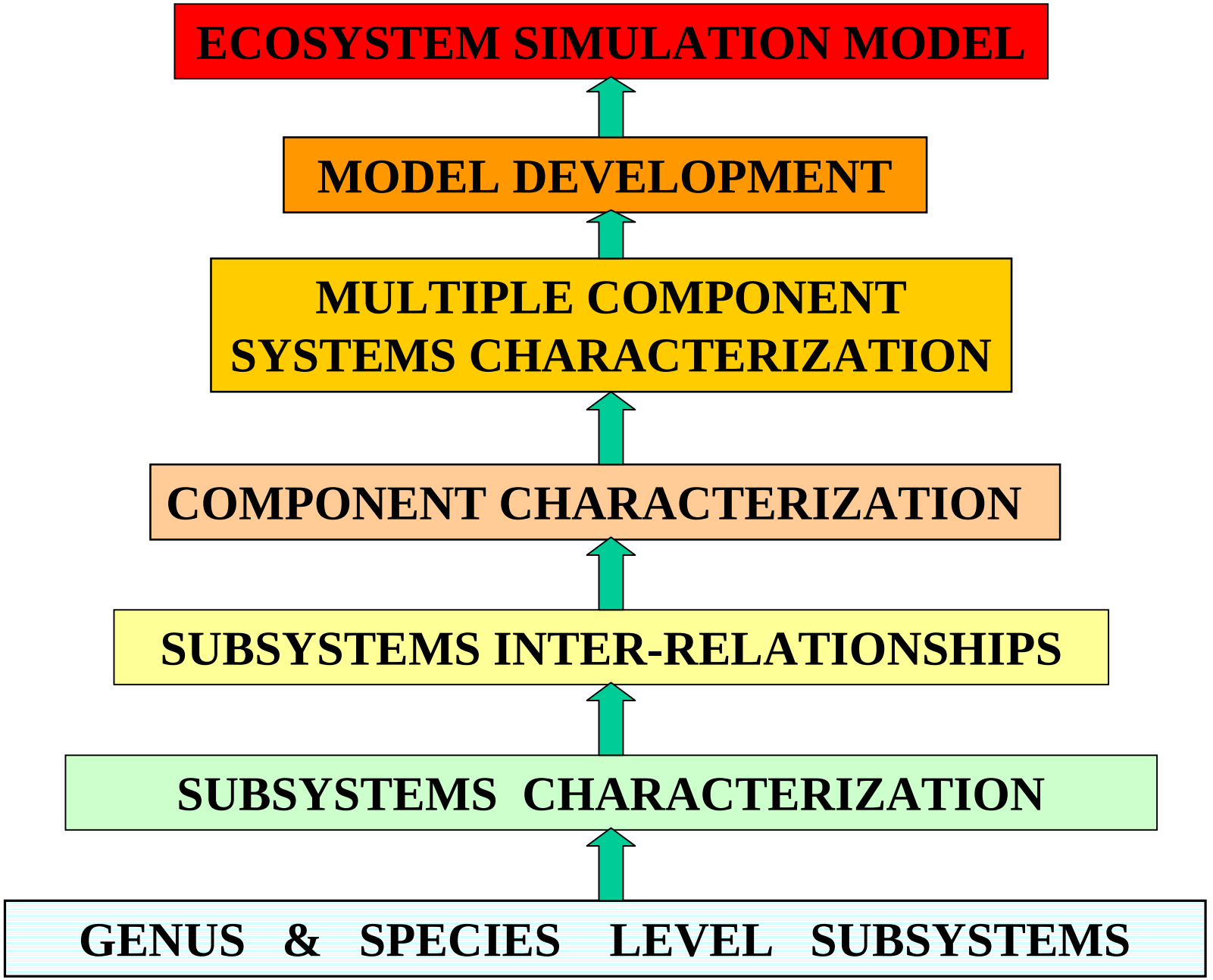
BENTHOS MICROBES

WATER HABITAT

BENTHIC HABITAT

TERRESTRIAL HABIT.

KNOWLEDGE LEVEL



MICROBIAL COMPONENTS

KNOWLEDGE LEVEL

DESIGN, MITIGATION

SIMULATION

COMPLEX MODELS

SIMPLE MODELS

INTERACTIONS

KINETICS

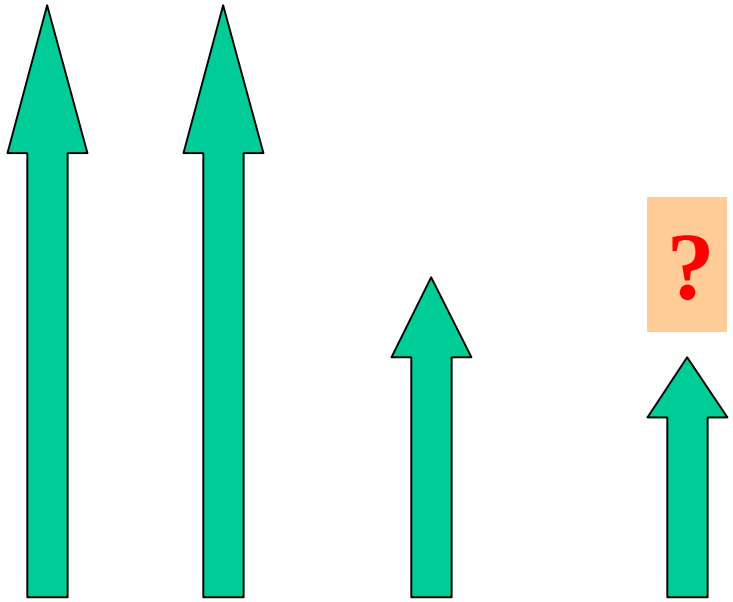
BIOCHEMISTRY, ETC.

CHARACTERIZATION

ISOLATION

DESCRIPTION

SOIL WATER MARINE STREAMS



A TECHNOLOGY PERSPECTIVE

I. DEVELOPMENT OF MONITORING, CHARACTERIZATION, AND ASSESSMENT (MCA) TECHNOLOGY FOR STREAMS & RIVERS

WATERSHED STEWARDS FROM 100'S OF GOVERNMENT AGENCIES & DIVISIONS ARE OVERBURDENED IN LABOR INTENSIVE JOBS OF DEALING WITH WATERSHED PROBLEMS OF MONITORING, MITIGATION, AND ADMINISTRATION WITH LITTLE TIME SPECIFICALLY FOR MCA TECHNOLOGY DEVELOPMENT

AGENCIES WITH WATERSHED RELATED MISSIONS & RESPONSIBILITIES HAVE BUDGET PRESSURES THAT PROHIBIT EXPENDITURES FOR SPECIFIC MCA TECHNOLOGY DEVELOPMENT PROJECTS - - - (BUDGETS DO EXIST FOR MITIGATION TECHNOLOGY DEVELOPMENT)

A TECHNOLOGY PERSPECTIVE

- **NO FEDERAL OR STATE PROGRAMS OR BUDGETS EXIST SPECIFICALLY FOR STREAM & RIVER HIGH TECHNOLOGY MCA DEVELOPMENT - - - TMDLS ALONE NEED IT- - -**

- **MOST STREAM & RIVER TECHNOLOGY IS "HAND-ME-DOWN" FROM OTHER APPLICATIONS OF OCEAN, MARINE, LAKES, SPACE, AND OTHER ENVIRONMENTAL APPS.**

- **CUSTOMERS FOR STREAM & RIVER MONITORING, CHARACTERIZATION, & ASSESSMENT (MCA) TECHNOLOGY ARE STATE & FEDERAL GOV'T AGENCIES**

A TECHNOLOGY PERSPECTIVE

- **MUCH OF STREAM & RIVER MCA IS CURRENTLY DEVELOPED IN UNIVERSITIES WITH VERY SMALL BUDGETS**

- **NOT MUCH SUPPORT FOR SCIENCE PROJECTS FOR RIVER ECOSYSTEM CHARACTERIZATION, BECAUSE IT IS VIEWED MORE AS BASIC SCIENCE & RESEARCH, WHICH IS NOT THAT POPULAR TODAY**

- **SPECIFIC STREAM & RIVER MCA TECHNOLOGY DEVELOPMENT IS NOT MARKET DRIVEN, BECAUSE OF SMALL MARKET.**

CONCLUSION

THE ABOVE REASONS ARE JUSTIFICATION FOR A SPECIFIC GOVERNMENT (MCA) TECHNOLOGY DEVELOPMENT PROGRAM

CONCLUSION

WE DESPERATELY NEED

1.

PROPONENTS & CHAMPIONS OF AN EFFORT TO DEVELOP AND APPLY ADVANCED TECHNOLOGIES TO STREAMS AND RIVERS

2.

A SPECIAL DEDICATED GOVERNMENT PROGRAM FOR SCIENTIFIC STUDY OF AND TECHNOLOGY DEVELOPMENT FOR MONITORING, ANALYZING AND MODELING OR CHARACTERIZING STREAM & RIVER ECOSYSTEMS

THE PROPOSED GOVERNMENT PROGRAM
I. NEEDED TECHNOLOGIES

A. WATER QUALITY MONITORING

•7 TO 10 VARIABLES CAN TELL HOW BAD, NOT HOW GOOD.
MONITOR FOR STREAM HEALTH, NOT JUST STREAM POLLUTION

•REAL TIME, 24 HR, 11 TO 12 MONTHS/YR

•DATA AUTOMATIC TRANSMIT TO MULTIPLE DATABASES VIA CELLULAR OR SAT. TELE. OR
SATELLITE DISH ANTENNA SYSTEMS

•REDUCE CARRYING SAMPLES BACK TO LAB

•MONITOR 40 TO 60 VARIABLES/PARAMETERS REAL TIME

THE PROPOSED GOVERNMENT PROGRAM
I. NEEDED TECHNOLOGIES

B. DATA TRANSMISSION, STORAGE, DISSEMINATION

TWO-WAY DATA TRANSMISSION TO MULTIPLE ON LINE DATABASES ON INTERNET, VIA

1. **CELLULAR TELEPHONE**
2. **SATELLITE TELEPHONE**
3. **SMALL SATELLITE DISH**

LAPTOP COMPUTER & SOFTWARE TO /FROM DATABASES BY STEWARDS IN THE FIELD

GOVERNMENT, & WATERSHED ORGANIZATION STEWARDS & PUBLIC MONITOR DATA IN REAL TIME VIA INTERNET FOR ON-LINE STREAMS

INTERNET ON LINE SUMMARY OF APPALACHIAN STREAM RESEARCH, MONITORING, CHARACTERIZATION & MITIGATION PROJECTS

THE PROPOSED GOVERNMENT PROGRAM
I. NEEDED TECHNOLOGIES

C. ON-LINE CAPABILITY

- DATA ACQUISITION, SCREENING MODELS
- DATA REDUCTION/CONVERSION
- DATA ANALYSIS, TREND ROUTINES
- DIAGNOSTIC MODELS (READ ONLY)
- CALCULATED DATA FROM ROUTINES
- CALCULATED DATA FROM DIAG. MODELS
- BIOENERGETIC DIAGNOSTIC MODELS

THESE CAPABILITIES ALSO HAVE OTHER MERITS

- INDUSTRIAL ACCIDENTS, SPILLS, & DUMPING
- EARLY DETECTION, WARNING & NEIGHBORHOOD WATCH (MONITORED BY WATERSHED ORGANIZATIONS JUST LIKE AMATEUR RADIO)

THE PROPOSED GOVERNMENT PROGRAM
I. NEEDED TECHNOLOGIES

D. STREAM ECOLOGY

- DATA NEEDED FOR BIOENERGETIC MODELS
  - DIAGNOSTIC --USER FRIENDLY
  - SIMULATION & QUERY
- DATA ON SEASONAL FOOD CHAIN
- RELATIONSHIP DATA AMONG ECO COMPONENTS
  FOR SPECIFIC STUDIES & BIOENERGETIC MODELS
  - WATER
  - BIOTA
  - BENTHOS
  - BIOTA MICROBES
  - BENTHIC MICROBES
  - BENTHIC HABITAT
  - BIOTA HABITAT
  - TERRESTIAL HABITAT
- STREAM LATERAL & TRANSVERSE SECTION DATA
- ON LINE VIDEO DATABASE OF MAJOR SPECIES
  AND STREAM REPRESENTATIVE REACHES VIDEO

THE PROPOSED GOVERNMENT PROGRAM
I. NEEDED TECHNOLOGIES

E. AUTOMATED SAMPLING, MONITORING & DOCUMENTTION TECHNOLOGY FOR BENTHIC, WATER QUALITY, BIOTA & TERRESTRIAL

- **REMOTE SENSING**
- **MICROBES**
- **VIDEO USE & VIDEO DATABASE**
- **SPECTRA (EMISSION, ABSORPTION, REFLECTION)**
- **FLUORESCENCE**
- **FIBER OPTIC SPECTROMETER APPLICATONS**
- **SPECTROPHOTOMETERS**
- **BIOTECHNOLOGY-- WE ARE NOW ENTERING THE BIOTECHNOLOGY AGE. HERE IS A GREAT OPPORTUNITY FOR APPALACHIA**
- **BIOSENSORS**

THE PROPOSED GOVERNMENT PROGRAM
II. MANAGEMENT & ORGANIZATION

BUDGET & TERM: $20 MILLION/YR, FOR 5 YEARS

	MIL $/YR	TOTAL/YR
A. EACH UNIV (6)	1.5	9
B. EACH STATE (10)	0.5	5
C. EACH MFG (5)	1.0	5
D. PROGRAM MANAGER	1.0	1
TOTAL		20

* UNIVERSITY & MANUFACTURER COMPETITIVE SELECTIONS & REVIEWS

* CONTRACTS INCLUDE COST SHARING


THANK YOU
for your
participation
ENJOY
APPALACHIAN
RIVERS III